

they are of much newer, and most probably upper green-sand age: to tabulate their fauna with that of the gault, lessens the working value of the tables materially. The upper gault only is thought to be present in the Isle of Wight, where it is 100 feet thick. The little that is known of the gault in the Midland Counties is collected together, and that of Cambridgeshire and the red chalk at Hunstanton is briefly described. A few pages are devoted to the gault in France, a few lines to that of Switzerland, but no mention is made of any equivalents in Germany or in Belgium. The pamphlet contains in a compact form a deal of information upon the gault, which would have to be sought elsewhere in many publications, and it may prove of value to students at home and abroad.

The author believes that the bands which are characterised by fossils peculiar to them at Folkestone, can be traced elsewhere in England and in France. The range through the gault of most fossils is probably less restricted than is imagined, but some species are apparently strictly confined to narrow zones at Folkestone, although closely allied species abound in cretaceous rocks in England, and even America. It is likely that zones of fossils were due to the gradual alteration of depth which enabled certain gregarious forms to exist on the spot for a very short time only after their first migration to it. Their presence elsewhere would not prove that the zone was a continuous one; it would only indicate that at some period, not necessarily a synchronous one, the sea at that other spot had fulfilled the conditions of depth, &c., under which alone the particular species could exist. The same view applies to the idea that upper gault only was deposited in the Isle of Wight. There is no reason to suppose that deposition did not proceed there in the lower gault age, and it is more probable that the sea was, during the whole gault period, only fitted to receive that form of silt, and those fossils which are known at Folkestone as upper gault. The lower gault is spoken of by the author as a shallow sea deposit gradually deepening to the chalk, but the President of the Geological Society has stated his opinion that the gault is an extremely deep sea deposit, while Mr. Gwyn Jeffreys has collected much evidence to prove that the chalk was formed in shallow water. Whether we accept them or not, the views of such distinguished men should find a place in a work intended to be exhaustive.

Travels and Researches among the Lakes and Mountains of Eastern and Central Africa. From the Journals of the Late J. Frederic Elton, H.B.M. Consul at Mozambique. Edited and Completed by H. B. Cotterill. Maps and Illustrations. (London: Murray, 1879.)

ONE cannot read Consul Elton's Journals without feeling how great a loss his death has been not only to the cause of the native African, but to African exploration. Elton was only thirty-seven years of age when he succumbed to the hardships of African exploration, but he had already done more than his share of hard and useful work. The handsome and beautifully illustrated volume before us deals with his observations and adventures in Africa from 1873, when he went to Zanzibar as Vice-Consul to his death in December, 1877, when trying to push from the north end of Lake Nyassa to the coast at Dar-es-Salaam. Much of the earlier part of the volume tells of the work Elton did in putting down the slave-trade in the dominions of the Sultan of Zanzibar. In carrying out this work he had to visit most of the coast from Zanzibar to beyond Mozambique, as well as Madagascar, and with the details of his more immediate mission, is mixed up a good deal of geographical information. He carried on his works of benevolence and exploration on his appointment as Consul of Mozambique. The chief novelty of the volume, however, is in the second part, in which the story of the journey from the north end of Lake Nyassa north-east to the coast is told. Here Elton, Cotterill, and their com-

panions broke on fresh ground, and made substantial additions to our knowledge of African geography and African people. With the main results of this journey we are already familiar, through the description of Mr. Cotterill at the Geographical Society and elsewhere. Elton left Mozambique in July, 1877, Livingstonia at the south end of Nyassa in September, and the north end on October 15. The country traversed was mainly hilly, rising in the Konde Mountains, north-west of Nyassa, to 12,000 feet. Elton speaks of the country as the "Garden of Africa." The party were delayed for a time in Merere's Country in the Konde Mountains, by one of those little wars, which so often embarrass African explorers, and during the delay some hardships had to be endured, which no doubt told on Elton's health. On December 19 he succumbed to what seemed sun-stroke, and was buried under the shade of a baobab in South Ushekke. Cotterill conducted the expedition to Bagamoyo, over what is comparatively well-known ground. In completing the narrative of the expedition and editing his late fellow-traveller's journals, in preference to publishing a narrative of his own, he has acted with an unselfishness which deserves to be acknowledged. The book is altogether one of much interest. The Rev. A. E. Eaton contributes a short Appendix on the Natural History of the Kungu Fly, out of which the natives to the north of Nyassa make cakes.

Conic Sections—The Method of Projections. By Rev. S. Bolton Kincaid, M.A. (London: Stanford, 1877.)

THIS book has only recently met our notice; it consists of a series of twenty-nine propositions deriving proofs of many of the chief properties of the ellipse by the method of circular projection. We have not come across any special novelty in the little book, nor have we detected many mistakes, though the lettering, from the use of like letters, we have found in many cases confusing. The figures face the text, and the circle figure is over the elliptical one; they are in many cases very roughly turned out by the engraver.

LETTERS TO THE EDITOR

[The Editor does not hold himself responsible for opinions expressed by his correspondents. Neither can he undertake to return, or to correspond with the writers of, rejected manuscripts. No notice is taken of anonymous communications.]

[The Editor urgently requests correspondents to keep their letters as short as possible. The pressure on his space is so great that it is impossible otherwise to ensure the appearance even of communications containing interesting and novel facts.]

Comet 1879 c (Swift)

THE following observations may be useful to some of your readers:—On June 25 the comet was compared five times with the star O.A. 3268, with a ring micrometer (power 35); on June 28 it was compared eight times with the star Dm + 71°, 184 by means of a bar reticule with power 70. The comet has a bright spot near the centre which, on June 25, seemed to me to be nearly equal to a ninth magnitude star; but on June 28 it was much fainter, although easy to observe with precision after 11h. 30m. The diameter appears to be 2' or 3' in my telescope (of 4½ inches aperture) but I cannot see any trace of the tail mentioned by Mr. Swift. The comet is, however, immersed in the twilight now existing at midnight.

1879.	G.M.T.		Appt. R.A.		Appt. Dec.	
	h.	m.	h.	m.	s.	
June 25 ...	11	57	49	...	2 49 37.1	...
June 28 ...	11	30	20	...	2 51 13.3	...
1, Vanbrugh Park, Blackheath						G. L. TUFMAN

The Mechanical Theory of Earth-Heat

IN reference to Mr. J. P. Lesley's inquiry as to whether plicated coal-beds are generally converted into anthracite, it has occurred to me that during a residence upon the Somersetshire coal district, thirty years ago, I recollect visiting the Vobster coal-pits, on the northern edge of the Mendip hills. The coal-seams are there exceedingly disturbed. One seam of coal was

said to have been pierced three times by a vertical shaft. Yet the coals are not anthracite. The Vobster pits are very fiery. The Radstock pits, where the coal is horizontal, not so; but they are worked in higher beds.

By reference to the Commissioner's report to Parliament, 1871, it will be seen (p. 38) in Mr. Prestwich's report on the Nettlebridge Valley coals, where Vobster is situated, that my recollections are confirmed; "bituminous coal" and "disturbed condition" being alike attributed to these coal beds.

With respect to the general question of the mechanical theory of earth-heat, I would respectfully refer Mr. Lesley to my examination of the theory in the *Philosophical Magazine* for October, 1875.

Harlton, Cambridge

O. FISHER

On the Origin of Certain Granitoid Rocks

In a paper by me "On the Pre-Cambrian Rocks of Shropshire," read before the Geological Society on the 11th inst., I call attention to certain granitoid and gneissic rocks in Primrose Hill, at the south-west end of the Wrekin. Associated with these metamorphic strata in such an irregular manner as to suggest an eruptive origin is a compact felspathic rock with minute quartz grains, which I at first presumed to be a quartz felsite. On submitting specimens to Prof. Bonney, F.R.S., for microscopic examination, he declared the rock to be clastic, and closely allied to the hälleflintas, which Dr. Hicks assigns to his Arvonian group. Certain observations recently made in south-west Shropshire, suggested to me a transition between the hälleflinta and the granitoid types, and, on communicating my suspicions to Prof. Bonney, he stated that a similar connection had been suggested by his microscopic examination. This morning I hammered over Primrose Hill foot by foot, and I have the satisfaction of announcing the fullest confirmation of our suspicions. In the same block, the compact hälleflinta is frequently mixed up with granitoidite and hornblendic gneiss. In some cases, the metamorphism has taken place only near the surface, as if produced by atmospheric agencies; in others the crystallisation occurs in nests, while in others there is a gradual transition in mass from a compact to a granitic structure. This passage of hälleflinta into granite has obviously important theoretical applications.

Wellington, Salop, June 21

C. CALLAWAY

Migrations of Birds

I NOTICED some time ago a communication in NATURE respecting this subject, stating that it would be instructive and interesting alike if naturalists would record any data they may have collected on this subject. For years now this matter has had my careful attention, and I therefore forward a few notes for the last two seasons, and also put forward the hope that observers stationed in other parts of the United Kingdom will contribute information of a like nature. I would also say that the weather noted applies to the night—the time, by the way, generally chosen for migratory movements.

Vernal Migration, 1878

Dates.	Species.	Remarks.
April 4 ...	Gray Wagtail ...	In pairs on the trout streams for nesting season. Weather clear, warm westerly breezes.
" 4 ...	Tree Pipit ...	In full song and seen for first time; westerly breezes.
" 15 ...	Redstart ...	In full song in Encliffe Wood and Rivelin Valley; warm westerly breezes, clear.
" 15 ...	Willow Warbler ...	Numerous, arrived during last night.
" 15 ...	Ring Ousel ...	Numerous and full of song.
" 18 ...	Chiffchaff ...	In small numbers, westerly breezes, very warm, close.
" 19 ...	Swallow ...	One specimen seen; westerly breezes, fine and clear.
" 19 ...	Cuckoo ...	Heard and saw flying over the busiest streets of Sheffield at 4.30 A.M.
" 22 ...	Whitethroat ...	One heard; dull and misty drizzling rain, W.S.W.
" 22 ...	Martin and Sand Martin ...	Numerous, in company with swallows in the Derwent Valley.
" 28 ...	Blackcap Warbler ...	First seen, but silent; warm breezes, S.E.S.
" 29 ...	Whinchat ...	Seen for first time, weather dull, S.E.S.
" 29 ...	Common Sandpiper ...	Seen for first time, in pairs, in Rivelin Valley.
May 3 ...	Landrail ...	First heard, weather dull and gloomy, W.
" 6 ...	Spotted Flycatcher ...	First seen, very wet night, wind direct, S. These birds are still solitary.

Vernal Migration, 1879

Dates.	Species.	Remarks.
Feb. 10 ...	Song Thrush ...	Arrived in night; dark and cloudy, wind W.
" 10 ...	Blackbird ...	Arrived in night; dark and cloudy, wind W.
March 20 ...	Yellow Wagtail ...	Numerous.
" 20 ...	Pied Wagtail ...	"
" 29 ...	Willow Warbler ...	One specimen seen, somewhat feeble, silent; wind W. by S., night dull and showery, snow only left ground day before. Never known this species so early before. Average time being April 5.
" 29 ...	Greenfinch ...	Again in usual haunts after being entirely absent during the winter, with the exception of one pair seen in a garden in Sheffield.
April 9 ...	Chiffchaff ...	Saw and heard in young fir plantations at Hollow Meadows, S.W. and westerly winds.
" 21 ...	Curlew ...	In pairs at breeding grounds on moors.
" 21 ...	Ring Ousel ...	Numerous on moors, mostly in pairs; no song.
" 24 ...	Tree Pipit ...	Arrived; dull and showery weather, easterly winds.
" 26 ...	Willow Warblers and Chiffchaffs ...	On the evening of 25th not a bird was seen; on morning of 26th the birds abounded and their cheery notes are heard on every side. The night was dark and showery (new moon), wind S.
" 26 ...	Cuckoo ...	Heard in Lees-hall Wood. This bird has arrived during past night, doubtless in same flight as willow warblers, &c.
" 28 ...	Swallow ...	Seen in Meersbrook Park; weather showery and dull, wind light from S.W., moonlight.
" 29 ...	Whinchat ...	Seen in Meersbrook Park; weather showery and dull, wind light from S.E., moonlight.
May 2 ...	Wheatear ...	On moors, full of song.
" 2 ...	Common Sandpiper ...	Rivelin and Redmires dams, in pairs. This species has been here some few days.
" 2 ...	Redstart ...	This bird has now arrived, but only seen in small numbers. Cold easterly winds, moonlight.
" 5 ...	Wryneck ...	Saw on Rivelin moors; solitary and uttering its whistling notes. Cold easterly winds.
" 8 ...	Landrail and White-throat ...	Heard in meadows; very scarce; probably came last night with a cold south-westerly breeze.
" 12 ...	Sand Martin ...	Skimming over the waters in small numbers. This species is remarkably late; wind N.W. by W.
" 13 ...	Blackcap ...	Singing in densest covers, and very shy. This species is very late. South-westerly breeze, clear night.
" 17 ...	Martin ...	Saw a pair of these birds; they are very late as compared with previous seasons. Southerly breezes and very showery.
" 24 ...	Swift ...	One seen on the borders of the Rivelin Moors. South-westerly breezes and very showery.
" 26 ...	Spotted Flycatcher ...	One specimen seen, silent and somewhat wary. N.W. by W., light, and showery moonlight night.

Such are a few extracts, taken *verbatim*, from my note-book; they might have been considerably increased, and the time of departure noted, as well as the arrival of our winter migrants, but I fear I have already trespassed too greatly on your valuable space. I sincerely trust that this interesting subject will be more fully discussed and studied by your correspondents and readers; for in that way many of the difficulties enshrouding the movements of the feathered tribes will be overcome.

Heeley, near Sheffield, June 9

CHARLES DIXON

Glow-worms v. Snails

YOUR correspondent, Mr. R. S. Newall, has unconsciously reversed the natural condition of affairs in his note (NATURE, vol. xx. p. 197). The heading should have been as above. Glow-worms *devour* snails, which are their natural food. The particular snail in question had probably been attacked by one of the glow-worms, which had left some of its phosphorescent matter adhering to it, and this occasioned the idea that it was showing through the body of the mollusk. Possibly in this case the snail may have proved too large for the glow-worm. An allied insect, *Drilus flavescens*, somewhat rare in this country, and not luminous, is, so far as the female is concerned, seldom